

Customer No. 24498

PATENT
PA040004

Tse



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Hong Wing Tse
Serial No. : 10/584,657
Filed : May 26, 2006
For : OPTICAL DISK DRIVE WITH POWER SAVE MODE

SUBMISSION OF PRIORITY DOCUMENT UNDER 35 U.S.C. 119

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is a certified copy of the priority document referred to in the Declaration, and the priority of which is claimed in the Declaration. The priority documents were filed in the EPO as follows:

EP Serial # 04290021.7, filed January 5, 2004

Respectfully submitted,

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Date: *19 July 2007*

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Date: *July 19, 2007* Signature *David A. Fourniello*



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Bescheinigung

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Attestation

Die angehefteten Unterla-
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europäischen Patentanmel-
dung überein.

The attached documents
are exact copies of the
European patent application
described on the following
page, as originally filed.

Les documents fixés à
cette attestation sont
conformes à la version
initialement déposée de
la demande de brevet
européen spécifiée à la
page suivante.

Patentanmeldung Nr. Patent application No. Demande de brevet n°

04290021.7

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk



Anmeldung Nr:
Application no.: 04290021.7
Demande no:

Anmeldetag:
Date of filing: 05.01.04
Date de dépôt:

Anmelder/Applicant(s)/Demandeur(s):

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Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Optical disk drive with power save mode

In Anspruch genommene Priorität(en) / Priority(ies) claimed /Priorité(s)
revendiquée(s)
Staat/Tag/Aktenzeichen/State/Date/File no./Pays/Date/Numéro de dépôt:

Internationale Patentklassifikation/International Patent Classification/
Classification internationale des brevets:

G11B19/00

Am Anmeldetag benannte Vertragstaaten/Contracting states designated at date of
filing/Etats contractants désignées lors du dépôt:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL
PT RO SE SI SK TR LI

PA040004*IPA*Th*050104
IA030052

05.01.2004

Optical disk drive with power save mode

Problem: For Discman product it is desired to reduce power consumption. Current products are driven in 2x speed mode
5 using a buffer memory. When the buffer memory is full the spindle motor is turned off, and when the buffer memory filling level falls below a threshold the spindle motor is turned on again. However, the pickup is still powered, i.e. internal photodetector IC (PDIC) and all servos are
10 still powered, which costs about up to 30 mW (some hours of playing time). Current practice is just "mute" all servos or just keep the spindle servo in place and switch off the laser in case buffer is full. However, the saving is not optimized yet. Simply cutting off the power supply
15 to the servos directly through the power supply to the servo driver IC is not recommended as it incurs higher manufacturing cost and a constant power loss even in normal operation. Further, there are timing problems regarding coordination as to when power supply is re-
20 established and when servo control is to be resumed.

Solution: It is proposed to not cut off the power supply of the servo actuators and the motors directly but to disable the driving signal from the servo controller indirectly through the gate signal to the servo driver IC
25 and then followed by the power supply to the internal PDIC of the pickup. This leads to nearly no power supply to the servo actuators, motors and the internal PDIC of the pickup with proper timing control as well as no additional power loss under normal operation. The turn on sequence of
30 a) turn on power supply to internal PDIC, b) turn on the driving signal, and c) let the servo controller start the rest of the servo sequence, which allows for correct and quick re-establishing of data reading, is thus guaranteed. See also drawing.

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Advantage: Reduced power consumption with no or nearly no recognizable negative effect.

If the power supply to the internal PDIC is directly cut
5 off earlier than the driving signal to the servo driver
IC, servo actuators (or even the motors) could be out of
control at that brief moment (which may damage the pickup
if it occurs frequently). Thus, the sequence to save
power is to first disabling the driving signal to the
10 servo driver IC then followed by the cutting off of the
power supply to the internal PDIC of the pickup. To
resume normal operation, the sequence should be in reverse
order. The time delay between these two actions is around
200ms or more depends on the response time of the external
15 circuit which control the disabling of the driving signal
to the servo driver IC and the power on/off to the
internal PDIC of the pickup.

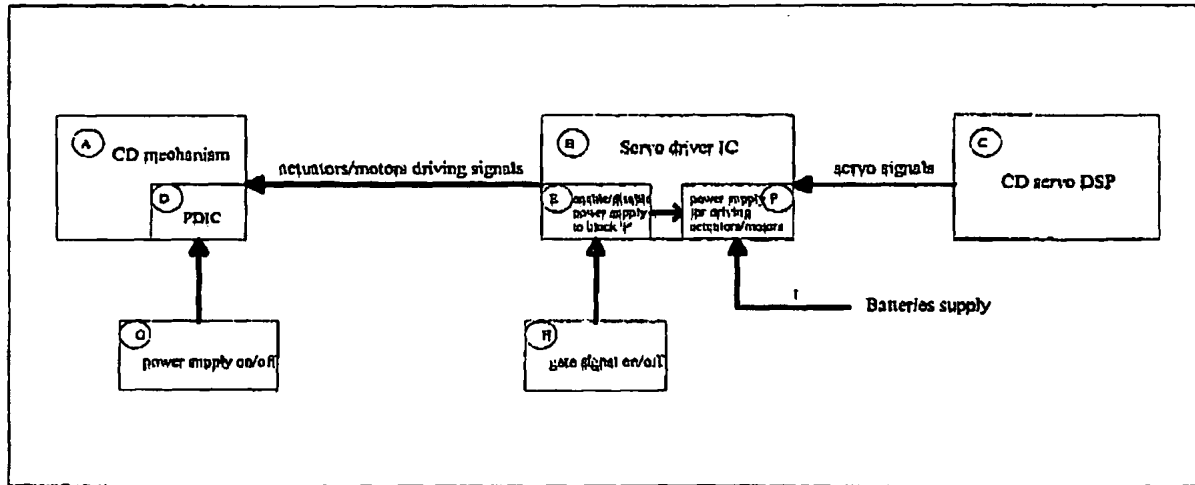
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Claims

- 1) Optical disk drive with pickup and controller, wherein
5 the pickup is equipped with a photodetector and a servo
actuator and wherein the controller generates a control
signal in response to photodetector signals said
control signal being submitted to the servo actuator
via a driver characterised in that the optical disk
10 drive is further equipped with a power save controller
for sequentially turning off power supply of the
controller followed by turning off power supply of the
photodetector and for turning on in the reverse order.
- 15 2) Method for driving an optical disk drive in a power save
mode having the steps of:
- receiving an indication to start power save mode
 - turning off a servo controller of the optical disk
drive
 - 20 - after that turning off a photodetector of the optical
disk drive
 - awaiting an indication to stop power save mode
 - turning on said photodetector
 - after that turning on said servo controller.
- 25 3) Optical disk drive or method according to one of the
preceding claims characterised in that turning on/off
the photodetector is performed by turning on/off a light
source generating light to be detected by said
30 photodetector.

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By cutting off the power supply to block 'F' via path 'I', the component cost (or BOM – Bill Of Materials cost) will be higher than the cost of block 'G' and 'H' together. Besides, there would be a constant power loss through path 'I'; whereas, the power loss through 'G' and 'H' is comparatively insignificant.

If we implement proper timing sequence for switching block 'G' and 'H', we would be able to achieve the power saving of around 30mW or more once memory buffer is full. This is roughly 8% to 10% saving depending on the system design and components that are being used.